2.1 / 15

AP Calculus - 2012-09-04

i) a $f(0) = 2$

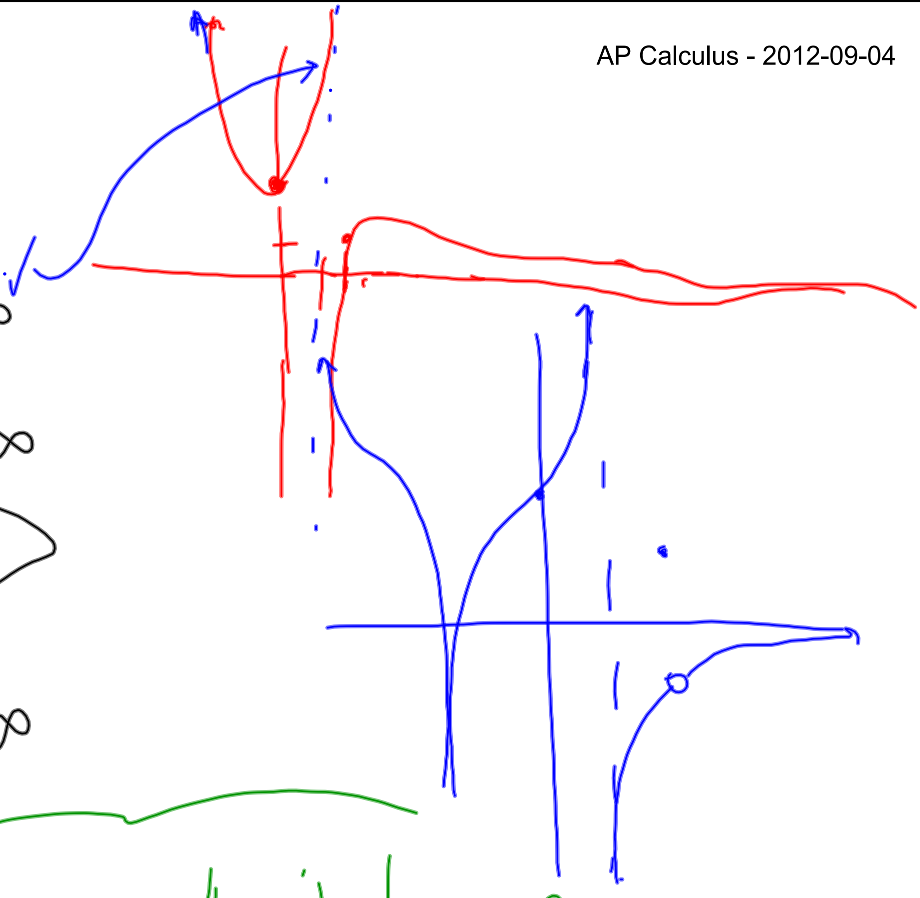
b $f(2) = 1$

ii) a $\lim_{x \to 1^-} f(x) = +\infty$

b $\lim_{x \to 1^+} f(x) = -\infty$

iii) a $\lim_{x \to \infty} f(x) = 0$

b $\lim_{x \to -\infty} f(x) = +\infty$



how can 1 side have a horizontal asymptote but other side doesn't?

Rational f^n Polynomial

$\frac{n}{x}$, $\frac{x}{n}$

$\frac{x+1}{x^2}$ $\frac{3}{(x+1)(x+2)(x+3)}$

rational f^n

$\frac{3x^2+7}{2x^2-1}$ $\frac{\text{Polynomial}}{\text{Polynomial}}$

$\frac{1}{\sin x}$ neither a rational f^n nor polynomial

Calculus "defn" of horizontal asymptote.

A fn $f(x)$ has a h.a. if either

$$\lim_{x \to +\infty} f(x) = L$$

or

$$\lim_{x \to -\infty} f(x) = L$$

and the eqn of the h.a. is $y = L$

To 'be' 'a' limit [i.e. to be an "L" in $\lim_{x \to \left\{ \begin{smallmatrix} +\infty \\ -\infty \\ a \end{smallmatrix} \right\}} f(x) = L$] it must be unique.

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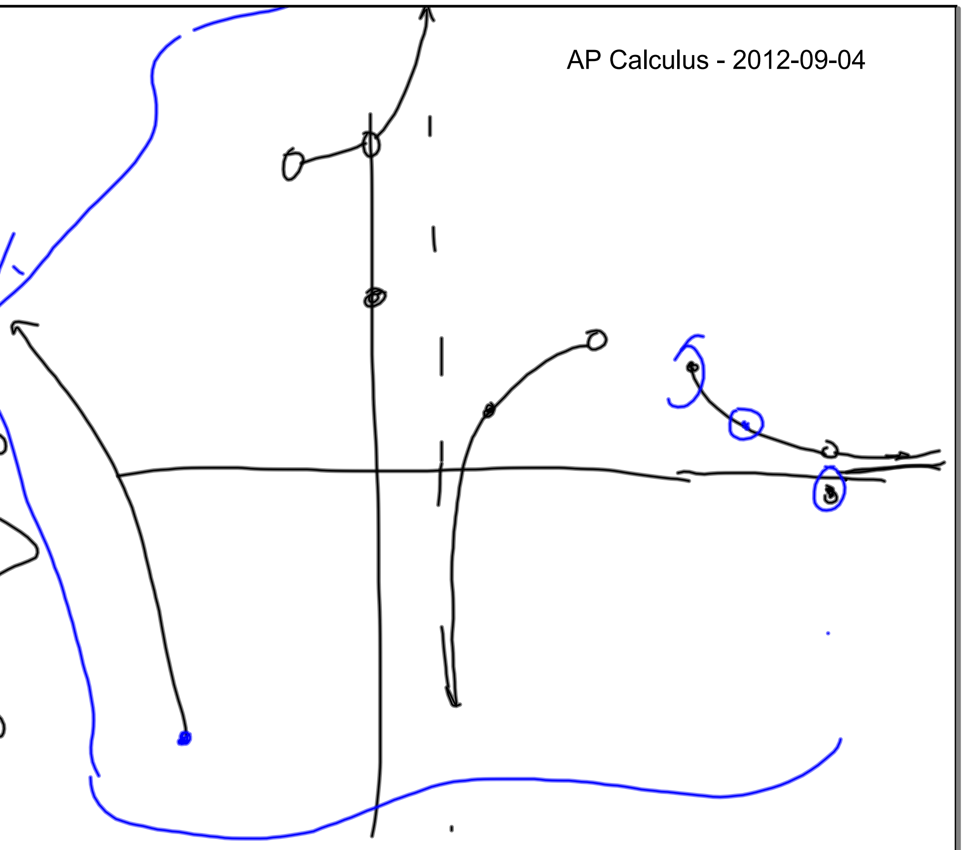


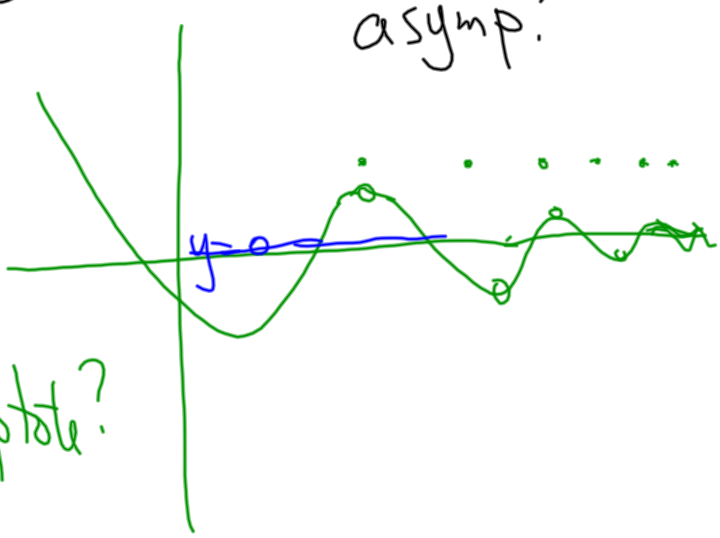
- Can there be two vertical asymp?

- can a f^n 'cross' its horizontal asymp?

YES

-Can a f^n CROSS a vertical asymptote?

NO



2.1/16)

i) $f(0) = f(2) = 1$

ii) $\lim_{x \to 2^-} f(x) = +\infty$

$\lim_{x \to 2^+} f(x) = 0$

iii) $\lim_{x \to -1^-} f(x) = -\infty$

$\lim_{x \to -1^+} f(x) = +\infty$

iv) $\lim_{x \to +\infty} f(x) = 2$

$\lim_{x \to -\infty} f(x) = +\infty$

Sep 4-8:33 AM